That was a fail! Boy choristers and vocal agency during adolescent voice change

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Abstract

Adolescent voice change (AVC) in cisgender males is not a sudden event. It occurs gradually and has been well documented by several studies which show how the speaking voice deepens in pitch during successive stages of puberty. The conventional SATB singing ranges do not allow for this gradual deepening. Boys with an investment in their soprano voice may work against voice deepening to maintain their range until they feel uncomfortable, experience "cracks" in performance, or accept the advice of a singing teacher to rest or move to a lower part. So-called voice "break" is therefore a psychosocial response to physiological change and questions arise about how much agency boys are able to exercise in determining their response. This study reports the experience of cathedral choristers, a group with unusually high levels of investment in the soprano ("treble") voice. Young singers were found to exercise relatively low levels of agency and were in receipt of variable advice across the sample of seven cathedrals. Some singing teachers felt they could continue for as long they felt no strain or discomfort, others that they should give up at the onset of puberty. The attitudes of choir directors were similarly variable, though levels of awareness and concern were most commonly quite low.

Keywords

Adolescent voice change, choristers, cathedrals, puberty, agency, will, vocal health.

Introduction

The term "agency" can be understood as the exercise of will in relation to identity. Vocal agency, by extension, refers to acts of will with regard to how identity will be portrayed by the voice. A voice deeper in pitch than that attainable by females has long been recognised as a key indicator of masculinity. In cases of gender dysphoria, voice deepening through medical intervention is clearly an act of agency. The exercise of vocal agency by cisgender males during normal puberty when similar changes occur naturally is less straightforward. A paper by the present author published in 2013 profiled the stage of Adolescent Voice Change (AVC) reached by the boys in seven English cathedral choirs (Ashley, 2013). The boys were assessed according to the well-known six stage developmental scheme published by John Cooksey (Cooksey, 2000). It was shown that it was not uncommon for boys to remain as "trebles" in choirs until or beyond the third stage of Cooksey's scheme, by which time their speaking voices had deepened and altered in timbre sufficiently to identify them as unambiguously male. In 2018 a further paper was published which profiled four senior choristers found to have two singing ranges, their familiar choir "treble" and a baritone range that was not used in the choir (Ashley, 2018). Two further choirs have been studied since the 2018 paper, bringing the total to nine.

The degree to which similar states of affairs were tolerated (or encouraged) appeared to vary from one cathedral to another. The role, if any, played by the boys' own agency was not clear. However, more recent case studies have shown that some boys at least might exercise a considerable degree of agency with regard to this matter (Ashley, 2024). Opinion amongst singing teachers is divided. Some advocate a strictly scientific approach in which a boy's agency should be over-ruled by assessment of the Cooksey stage he has reached whilst others incline to a more liberal view based on perceived levels of comfort. My aim in this paper is to remain relatively impartial and instead draw on previously unpublished qualitative data that show how the matter is understood by the boys themselves.

Efficiency or Catastrophe?

Andrew Nethsinga recently asserted that "boys' voices tend to reach their peak around Year 8 [12 – 13]" reflecting the commonly held belief that a cisgender boy's voice is at its best "just before it breaks" (Nethsinga, 2012; Giles, 2010, Jones 2003). The perception of a voice being at its peak "just before it breaks" in Y8 is subjective. Cooksey supported with sonographic evidence his view that a boy's voice is most likely to reach its "pinnacle of beauty, power and intensity" somewhat earlier during Y6 (Cooksey, 1992: 55). For the majority of boys at the time he was writing, Y6 was the cusp of pubertal onset. By the time Y8 is reached, most boys will have progressed through at least one stage of puberty, possibly as many as three or four. He demonstrated progressive deterioration in the quality of the soprano range during the first two stages of puberty and did not expect boys to continue in that range once falsetto notes had begun to appear towards the end of the second stage.

It is possible that in boys who sing intensively, increased muscular control may compensate for increased breathiness and declining richness of upper partials (Barlow and Brereton, 2008; Williams, 2010; Weinrich et al, 2020) but the third stage represents a mid-point when the new falsetto notes are erratic, the modal range has contracted to its smallest, and the voice is "most vulnerable to abuse" (Cooksey 1992: 11 and 57). Morris (2011) considered that boy choristers singing falsetto are able to create the illusion of a "head voice" by maintaining a higher closed quotient (CQ) than would otherwise be the case. Williams (2010) determined that boys who sing intensively in a professional context may appear immune from the difficulties associated with stage 3. In 2010 she wrote of the stage 3 laryngeal waveform that:

> [it] had more similarities with that of an adult female or an adult trained countertenor. It is suggested that the training these boys received as children enabled them to shift into a hybrid form of phonation, seamlessly bridging the gap between child and adult. This finding had important implications for the training of boys during voice change. When they are actually capable of singing both parts, should they sing soprano or baritone? (Williams, 2010: 292).

Since then, she has tended to answer her own question, writing only a year later that "boys sing too high for too long" (Williams, 2011). Not all singing teachers agree that this is the case. Baldy (2010) described the powerful and useful falsetto employed by final year choristers as "rather a nice final flourish for them". Allwood considered that a boy might continue as a treble ". . .for as long as there is no pain or discomfort, when of course he must then stop." (Allwood cited in Ashley, 2009). Morrison (2014) sees no reason to retire boys needlessly early.

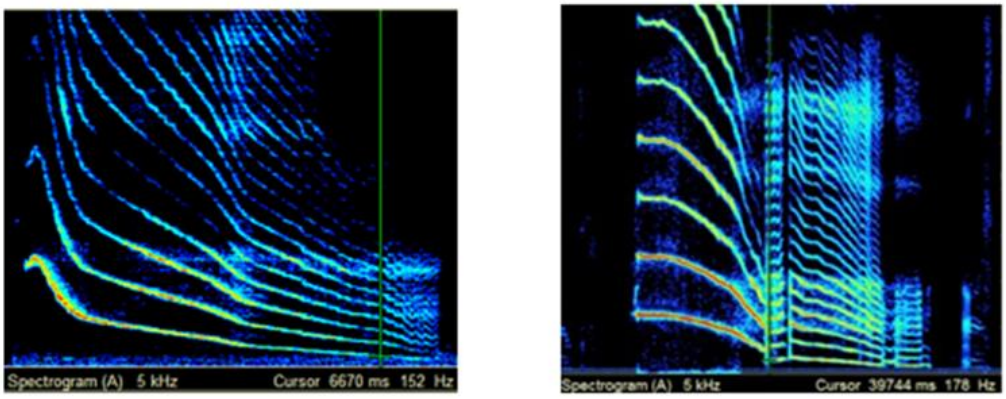
Williams et al (2021) consider that such views are part of the problem, noting that "in many of the Cathedral foundations, the decision to remove a boy from the treble part will be based on perceived comfort levels". They show the extent to which phonational efficiency declines after the onset of puberty and link this to a view of "voice break" associated with catastrophe theory. They consider that "due to the paucity of formal training in vocal health and singing pedagogy, the level and consistency of training offered to choristers in UK cathedrals is at best, variable" (Williams et al 2021: 15).

The unused baritone range

The full methodology of the study from which the data shortly presented have been obtained has been described previously (Ashley, 2019; 2018; 2013). The relevant test protocol items and ethics statement are included for reference in the present appendices. Here I describe the two tests most relevant to the identification of boy choristers with unused baritone singing ranges.

Figure I below shows two spectrographs generated by the Voce Vista® software. Boys had been asked to perform a continuous vocal glide from the highest note they could reach to the lowest. On the left is the result from a nine-year-old with unchanged voice. This shows the child modal voice across the entire possible range. On the right is a thirteen-year-old where the M2 ("falsetto") and M1 modal voice, together with the "crack" or phonational gap between the two are all clearly visible. Critically for the boy on the right the M2 portion of the glide roughly corresponds with his former modal "treble" range (G5 down to E4 where the gap occurs) whilst the M1 is his original modal voice which by now has migrated down to the range A2 - D4. This boy was one of several well past Cooksey stage 3, possessing the vocal qualities of a firm and clear new modal baritone but using only the M2 portion below right to maintain position as a treble.

Figure 1



Continuous modal clear falsetto/modal break

The other test that proved particularly instructive and a means of generating informative conversation was to sing the tune of *Happy Birthday* to the words "You owe me five pounds" in a key intuitively chose by the boy with no starting note given (the "£5 test"). This test was devised as an indicator of tessitura. Tessitura is understood to have two meanings. The first refers to that part of the singing range where the voice is most comfortable, where there is no strain for high notes, no significant weakening towards the lowest notes and the voice can function without stress for sustained periods. The second meaning of tessitura refers to the notes that occur most frequently within the range of a vocal part that may extend further at either extremity.

As choristers progress through adolescent voice change (AVC) the part tessitura remains the same, but the vocal tessitura progressively changes. For example, Stanford's C major Magnificat has a full range of E*b*4 – G5 and a tessitura of G4 - E5 (pitch centre 525.6Hz). Cooksey gives a tessitura of D4 – C5 for unchanged voices which results in a pitch centre of 408.5 Hz, some four and half semitones lower than the part tessitura. By the second stage of change the vocal tessitura has descended to A3 – F4 (centre 284 Hz) rendering the part tessitura centre approximately ten and a half semitones higher. By the third stage of change when the vocal tessitura has both descended and contracted to F3 - D4 the pitch centre of 234.2 Hz is now almost 14 semitones below that of the part tessitura.

Boys successfully performing the "£5" test almost invariably pitched it within a clear and comfortable octave towards the bottom of their modal range. The tessituras thus identified corresponded well with those given by Cooksey. This is shown schematically in Figure II.

Figure II

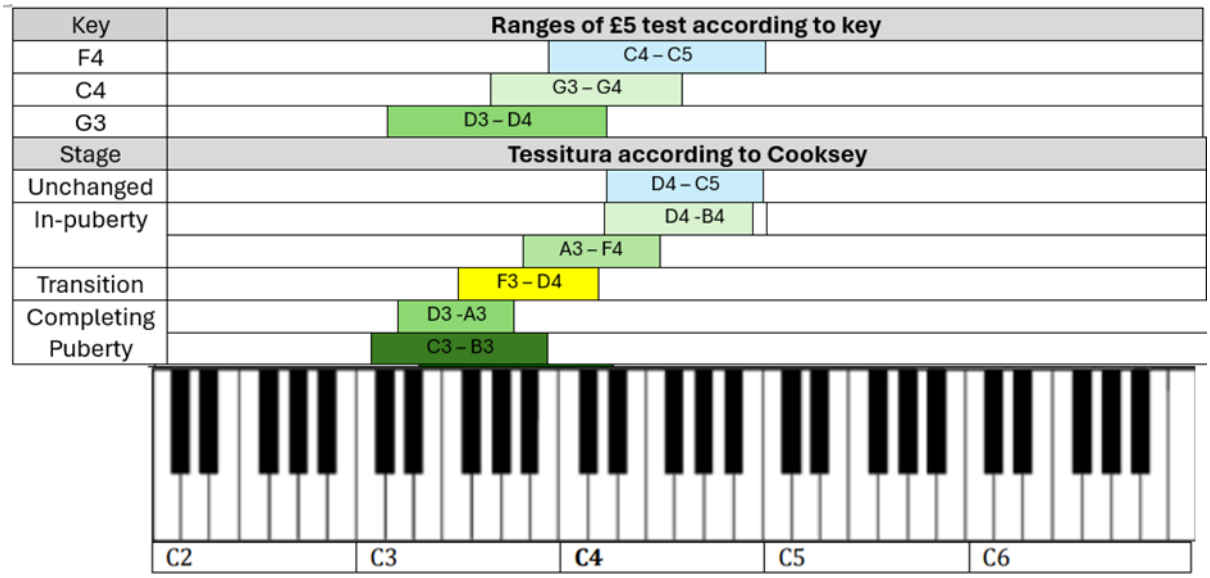


Table 1 shows data for all 127 boys across the enlarged sample of nine choirs. Mean speaking fundamentals (SF_0) quoted were derived from EGG measurements of each boy counting slowly and monotonously backwards from twenty. The segment from twelve to five was used as experience shows this is when the voice is most settled. Results were grouped in four discrete categories and row one shows the raw number of boys falling into each category. Those with SF_0 >220 Hz were considered to have unchanged voices. Those between 200 and 219 Hz were considered to be peripubertal or in the early stages of puberty, those between 170 and 199 Hz in mid-puberty and those <170 in the late and final stages of puberty. It will be seen that those in mid-puberty constituted the largest number (41, or 32% of the sample). Only twenty-six choristers had unchanged voices. Nearly as many (twenty-five) were in late puberty, and the M1/M2 split illustrated in Figure I was found only in this group.

Table 1
127 boys aged 09:01 – 14:11

SF_0	>220Hz	200 -219	170 -199	<170
number	26	35	41	25
Mean Glide Centre	494.2	501.4	509.7	360.9
Mean Tessitura	C4-C5	B3-B4	A3-A4	D3 – D4

Row two shows the mean glide centre. This figure is derived from the highest and lowest pitches recorded in performing the downward glissando. These figures indicate that glide range increased as boys gained in age and experience, but then fell quite rapidly once the end of puberty was near. Finally, row three shows the mean tessitura as indicated by the key chosen for the £5 test. The £5 tessituras fell steadily largely in step with the tessituras given by Cooksey. These are not surprising results. The interest lies in the fact that the twenty-five boys who recorded a tessitura in the tenor octave were still serving in the "treble" sections of their respective choirs.

The boys' own understandings and expressed agency

The examples that follow have been chosen to illustrate the different choir regimes that were found and the understandings shown by their young members. For the sake of brevity, not all choirs studied have been included. Those chosen represent the full range of circumstances encountered before data saturation is reached.

Choir 1

16 boys aged 11:06 – 13:05 (Y7 & 8 only)

SF_0	>220Hz	200 -219	170 -199	<170
number	2	5	5	4
Mean glide centre	501.3	577.8	489.1	198.1
Mean tessitura	-	C4 – C5	A*b*3 – A*b*4	D3 – D4

This was a relatively large choir and only the boys in Y7 and 8 were seen. There were nine boys in Y8 and four of these had already left the choir by the month of assessment (March). Each of these boys understood that they had been singing falsetto for a short while before leaving.

Age 13:02, SF_0 135 Hz

And, you left the choir when?
It was, the, in half term so it'd be about two months, a month ago?
Right. And just tell me, how was it decided that you were going to leave? *What happened*?
Urrm, well my voice like, it was uncomfortable, so I was singing in falsetto, so um yeh basically, it just got uncomfortable and the top of my range just went down and down, and I couldn't really sing in um treble anymore so
Now who noticed that? You or your, what's the name of the organist…who runs the choir?
Um, um, um <n>
Was it his decision or yours, or both?
Um, both really.
Right
Well he really decided um when the right time was to leave and then I decided what day (indistinct) should be

Age 12:09, SF_0 133Hz

Er, I stopped singing, er, just at the beginning of advent, so after the advent carol service.
Oh right, so you missed Christmas?
Yes. And (indistinct) to stay on because I had a falsetto voice that went up to a top C er er well my voice, 'cos it actually started to change properly in the summer but when I came back I had a falsetto voice came up to top C which allowed me to sing for a term and a bit.
And everybody was happy with you singing in that falsetto voice?
Yes, yes.
Did you have any problems in the lower, er, range? Down sort of middle G above middle C? Did that create any problems?
Not really. Um. Ah well. I couldn't go too low but when I stopped I started to get some more, to get the lower (indistinct…low)
Right. You're confident it was falsetto you were singing up to..
Yes. (spoken affirmatively and confidently).
Why are you so confident you were singing falsetto?
Er well, my singing teacher had explained and of course I couldn't crescendo or do any more
Aha!
So, yeh all I had was the note

Yes, that's the dead giveaway, if you can't crescendo then that is falsetto.

Age 13:04, SF0 137 Hz.

It was alright? You weren't upset to miss Christmas?
Well I was upset I was gonna . . .(indistinct) . . .good to be home, first time for a few years
When, you know, you started the year, were you hoping you'd last the year or were you looking forwards to leaving?
Well I thought I'd last the whole of Y7 but, um, it didn't (fades to very quiet voice)
Um, and can you just tell me how it was decided you weren't going to sing anymore?
Um, basically I'd been off for a about a couple of months er just to throat problems then I went to er a specialist and he said it's 'cos your voice is changing and then I just kinda stopped, 'cos obviously it was really he knew what he was talking about.
Yeah, absolutely. So when did the throat problems start? Was it this school year?
Er, No it was in, it was in Y7, just it was kinda at the start of Y7 I hadn't been singing for very long.

Age 13:05, SF0 140Hz

And last question, how was it decided that you were going to leave? What actually happened?
Well, um, my voice began to get lower, I ended up having to sing falsetto..
Right
..in the choir and, um, it ended up with my voice not actually, it, my voice didn't exactly fit in with the rest of the choir so I had a discussion with my parents about it, and Mr <n> (indistinct)
Did he ever say anything um during a rehearsal like your voice is having a bit off today
No
So he wasn't listening to you individually?
He was occasionally
Right. And you confident you were singing falsetto are you?
Yes.
How are you confident? What made you think that was falsetto?
Well, it was the fact that it was a lot weaker than it was before and I had to use a different part of my voice and a different part of my brain to actually sing.
That's interesting. Were you aware of a particular note where you came out of falsetto into normal voice
It was about, sort of E just above middle C to about G, was sort of the break point.
OK. And were there any notes that you couldn't sing at all, where no sound would come out?
Um sometimes around my break point I wouldn't be able to sing any notes
And when you were singing in falsetto, could you control the volume? Could you crescendo, decrescendo?
Um, (pause) not, not that well. Not that well.

All four of these boys had a clear understanding that the trigger for their choir dispensation was the emergence of falsetto. Each had sung for a short while after the falsetto notes first begun to appear and these had been noted by the choir director. One of them mentioned that the singing teacher had also explained the position. Lack of dynamic control was cited, as was fatigue or strain. The fourth described an almost "textbook case" with a phonational gap and the M1/M2 split occurring at middle E. All four had speaking pitches ranging between 130 and 140 Hz.

In choir 2, we find a very different situation.

Choir 2

13 boys aged 09:01 – 13:07

SF_0	>220Hz	200 -219	170 -199	<170
number	0	7	3	3
Mean glide centre	-	421.5	485.8	621.5
Mean tessitura	-	C#4 – C#5	A3 – A4	C3-C4

Unusually, the next boy's voice cracked on the number four during the counting backwards test, suggesting possible issues ahead.

Age 13:05, SF_0 153 Hz

What happened on the number 4?
Ymm, don't know. Went kind of bit…
Does that ever happen when you're talking at school?
A little.
Yeah. How d'you feel when that happens?
Mm, a bit annoyed sometimes.
Hmmm. Yeah, that's a crack because your voice is changing.
Mmm.
OK stand up and sing
That there?
Yes, you owe me five pounds.
Ach
(*He has difficulty starting but eventually begins on the note E4. He is unable to phonate the higher E5.*)
Ah, God!
Keep going.
[He starts the third line again and this time manages the octave leap but is a semitone flat on the E5].
God that was fail.
That was what?
A fail!
A fill?
(chaperone calls out "a fail!")
A fail? Oh! Why was it a fail?
I don't know. (dejected pause). Just rubbish.
Why do you think it was rubbish?
My voice is changing?
Stand up again and sing it like a man. (*Demonstrates starting on B2 in a very deep voice*)
[Begins again on E3 and completes the test slightly erratically but successfully in key of A3]
I'll shut up and see (indistinct)
He's a star! (laughter) *Right, no this is really interesting. This is exactly what this is about.*
(Indistinct, more laughter).

This is a case that demands empathy. The boy thinks he has failed and that his performance was "rubbish". It appears that this may be the first time he has confronted the fact that his voice may be changing, which was suggested to him by the researcher as an explanation for the "crack" in the speaking voice. He seems unprepared and sings for perhaps the first time in his new baritone range at the request of the researcher.

The next boy, aged 13:07 (and therefore Y9), successfully performed the test in the treble range C4 – C5. This was clearly falsetto and the C4 was particularly weak and breathy. The pitch dropped almost a semitone during the test. He was then asked to sing it lower but seemed unable

to do this. He began again on the same C4. He was next asked to sing it "more like a man". He had difficulty at first finding a note in the tenor register but eventually hummed a C3 (tenor C). The researcher asked him to start on that note and he successfully sang the test in the range C3 – C4.

Age 13:07, SF0 131 Hz

Would you like to stay in the choir after Y8?
Some of it.
Yeah, 'cos quite a lot of cathedrals they kick 'em out at the end of Y8 don't they? When do you think you will leave?
I dunno, I think just before the summer.
Just before the summer? You don't think you'll last until the end of the year? Why d'you think that?
Um, 'cos I don't seem to have ..kind of...(indistinct)..you know it strains my voice when I try and go high.
Right. You are getting the top notes. Are there times when you're singing, and it's hurting you, you just rest it for a while? In the middle of the service?
Sometimes, yeh.
Do you have any strategies for pretending you're singing when the notes get too high?
Like miming
Do you ever mime?
I have done, yeah.
How often?
Not that often.
Do you think they notice?
Mm
You're never told off for it?
Nnh.
'Cos your voice was doing exactly what Christopher's was. Did you realise that?
Mm
And it's splitting. You're singing your treble notes and you've also got your new adult voice at the bottom and you're getting the gap between the two. That's really interesting. Thank you.

Significantly, the idea of miming is brought up by the boy himself, the researcher having simply asked for "any strategies".

Another of the boys, who was studied longitudinally, became head chorister and remained in the choir until age14:09. He gave the following explanation of his apparent longevity. It would appear that his own agency played a significant part in the selection of the dispensation date.

> Well, the main reason was for the pure enjoyment of being in the choir. The time that I was in it, it was always enjoyable. I wanted that to go on for as long as it could, because although it was a strain to keep singing every week, the enjoyment of it I wanted to prolong for as long as I could because I could still just about sing if I strained.

Choir 3

In choir 3, we find boys who were fully aware of the fact that they quite often mimed during services. Here the boys accepted that things were the way they were. Chronological age would determine their dispensation date.

16 boys aged 10:03 – 13:05

SF_0	>220Hz	200 -219	170 -200	<170
number	6	1	7	2
Mean glide centre	480.8	523	606.6	224.2
Mean tessitura	C#4–C#5	B3-B4	C4 – C5	D3 – D4

Two of the boys (ages 12:06 and 13:01) qualified and both performed the £5 test in the baritone range (keys F#3 and G3) whilst neither attempted it in falsetto. Both were aware that they could only reach treble notes in falsetto and that this was hard work, unsustainable and sometimes uncomfortable. Neither of the boys began their downward glissando in falsetto, choosing a beginning pitch that was already in the modal range. Each was given a starting note for pitch matched scales at a pitch above where any M1/M2 break would be likely.

Age 12:06, SF_0 152Hz

OK. Now we'll start on this G if we can (G4).
[Sings in falsetto. Sounds strained]
That's hard for you isn't it?
Yes.
Just try. Imagine you're actually in choir this morning (plays note again)
[Sings in clearer falsetto to oo].
Open your mouth and go ah.
[sings oo again a bit louder]
OK. Right, OK. If I accompany it, try and sing down and we'll keep going down as low as we can.
OK
[Starts to oo and changes to ah on D4. Continues to C3 clearly, then to A2 beginning to strain and weaken].
That's it. It's just below tenor C isn't it?
Yes.
And you say you sing falsetto in choir?
Yeh.
Is that what you think or is that what somebody's told you?
Um well, Dr <n> told me to, well, he told me to keep trying to sing, um, and falsetto seems to work OK actually at the moment so I keep going
Mmm
I mean it wears my voice out quickly so I have to rest it quite often but
Mmm. It will wear your voice out.
Yeh
It'll dry your vocal folds out.
Yes.
Do you drink a lot of water?
Yeh I do drink quite a lot.
Yeah, yeh. OK. Well I won't ask you to sing up the scale because it's quite clear that you find that hard.

Age 13:01, SF_0 157Hz

Yeah it's not the treble register is it?
No
It's its..
It's the tenor register.
It's the tenorish register, So you automatically went,
Yeh

you didn't try and stay a treble, you went to where your voice was taking you
Yes.
So what are you doing in choir? Every day?
Um, Miming really. (slight laugh)
Miming?
Yeh. At the moment I mean Dr <n> wouldn't um, made a decision yet, um, what to do. I think he's just concentrating on, you know, the America, the upcoming America tour.
I know he's very busy with that, *yeah*.
I don't know what. He hasn't said anything, so
So, so he hasn't told you, well he obviously wouldn't tell you off because he knows boys' voices change
Yeh
But he hasn't taken you aside and had a discussion about how long you're going to stay or anything?
Um no, not yet no.
Hmm. *What would be your wish, erm, you know, what would you like to do*?
What, singing wise?
Yeah
Well um tenor or a bass, preferably, but I mean, um, it just depends on what's to come really
Mmm
You know, you can't decide
No it's hard isn't it
Yeh.
So if you could leave the choir tomorrow, would you want to, as a treble?
Um (drawn out) that's quite a difficult question, I mean, um (long pause) um, I don't, I dunno, probably not really 'cos I'm about the right age for the voice to break now.
Mmm
Well, I mean I'm quite enjoying experiments with my voice now.

Choir 4

This was one of two choirs that had no boys with a SF_0 of less than 170Hz. None of the boys had a split M1/M2 and all performed every test in modal voice. However, two had been allowed to sing alto and are not included in the table below.

21 boys aged 09:03 – 13:04

SF_0	>220Hz	200 -219	170 -199	<170
number	5	9	6	0
Mean glide centre	509.4	469.8	449	-
Mean tessitura	C#4-C#5	B3-B4	A3 – A4	-

One of those singing alto was assessed in March during the year in which he was in Y9. He recalled how it had been decided that he should stay on for one more term, but as an alto. He and one other Y8 boy sang alto until Christmas. Significantly, when tested he had no M1/M2 break even though he had reached the age of 14. His glide centre was 317.5Hz and he sang the £5 test in modal voice range G3 – G4. At no time during the interview did the question of falsetto arise.

Age 14:03, SF0 176Hz

And you sang alto in the services?
Yeh.
So that Christmas you were singing alto?
Yeh
So tell me about the last time you sang treble.

It was the end of Y8.
The end of Y8? And were you struggling with any of the high notes then?
Um, past top A, I was struggling a bit, yeh
Well top A is pretty high.
Yeh
So you were getting pretty much the normal range. And who in the choir was doing all the top treble solos in that term?
Um this boy called <n>
And what year was he in?
Y8. He was in Y8.
And had you done solos previously?
In Y9?
No in Y8. What was the last good solo you remember singing?
Jesus walking on the waves (said without hesitation)
Don't know that. Is it a good piece?
It's got top Bs in.
.....
And when you were first struggling with high notes, was it you that noticed it first or someone else?
Um (pause) I didn't really have any solos since then so no one really noticed I wasn't getting the high notes as good as I could.
Right, but were you still singing them? You weren't..
Oh yeh (affirmatively)
Did you ever have to mime notes?
Yeh.
And did <conductor> know you were miming notes?
No. Not until Y9.
And how did he find out you were miming notes?
Er, he asked me to sing a warm-up on my own and I couldn't get it.
And what was his reaction?
He asked me afterwards; does it feel OK?
And what did you say?
No.
Sorry to give you this grilling but it's really helpful. In what way did it not feel OK?
Just hurt at the back of my throat.
Right.
I just couldn't make any decent sound.
So what was then decided?
That I'd leave at Christmas.
So, right, in between then and Christmas you dropped down to alto?
Yeh.
And were you having singing lessons at the time?
Only about one or two.
And what was said in the singing lessons? Was the fact that your voice was changing discussed?
Yeh. He said I should keep on two more weeks to see how it changes. And then we just did (indistinct).

There is a contrast here with Choir 3 in that whilst the conductor is too busy to hear boys at every rehearsal, he does appear to pay more attention to the stage of development they have reached. It is relatively unusual in an English cathedral choir for a boy to be given the opportunity to remain for a while as an alto. What is perhaps most significant is that whilst some may have begun to struggle in their modal voices none was found to be singing falsetto.

The boy's agency was to be content with the way things were perhaps inevitably developing. Two years later a new director of music was in post and a further visit was made to investigate the case of another boy where the singing teacher had expressed some concern about the boy

remaining "treble" against his advice. On this occasion, the boy was found to be singing entirely in his M2 register. Tessitura as determined by the £5 test was C#4 – C#5. When invited to perform in the tenor octave he was able to phonate the C#3 but not the C#4 and was clearly unused to singing in his M1. The break from M2 to M1 in the glissando occurred at the unusually low pitch of 212Hz. Further technical details of this case are found in Ashley, 2018: 148 – 149. Here I reproduce evidence that confirms the extent to which it was his agency to remain without coercion, and that he was knowingly supported in this agency by the director of music.

Age: 13:03 SF0 109Hz

Boy: Well, I'm in the cathedral choir at <place> and I can sing falsetto, so that means I know all the repertoire and all the younger choristers can follow me, which is a good thing 'cos I'm head chorister.

DoM: Well, <n> has been a chorister here at the cathedral for about four years now and the fact that he's been singing every day during that time probably has something to do with the fact that he's able to keep on singing . . . Imagine you'd been doing something for the last four or five years, suddenly to stop doing it, that's a big change in your life, so it's very important that we prepare a boy for the time when he has to leave the choir because it isn't just his voice changing, it's his whole life changing.

Also in Ashley (2018) are technical details of two other boys at another cathedral where similar strong M2 phonation was found (Ashley, 2018: 149 – 150). Their choir is referred to here as choir 5 in order to maintain consistency of identity, but the other boys in the choir were not studied. Here an important part of the conversation with one of these boys is reproduced. He had misjudged where his tessitura lay, resulting in a "crack" and breakdown during the £5 test.

Age 13:11, SF0 116.9Hz

The key you chose, was it a good one?
No
Why wasn't it a good one?
Because it was on the voice break.
It was. Choose another key that avoids that problem.
[Hums D*b*3 and begins in that key. Flips to falsetto on the octave leap]. Oh f***! (much laughter)
What are you going to do <n>? You're in a tight corner here!
[Begins again in M2 on E4 and is successful in range E4 – E5. Sounds "falsetto" and he is clearly not happy].
Actually <n>, sing it boldly.
I don't know, I don't know. (sounds worried).
That key that you just chose, as though you were in the cathedral, in a concert, and you've got to do it properly, sing it in that key now.
[Sings again in a clear treble that sounds "head voice"]
Brilliant!
I hate my life.

This boy was spoken to again several years later when a young man at university. Reflecting on his time as a chorister, he clarifies the role of agency. He is recalling his experience of joining the cathedral's voluntary choir as a bass after the summer holiday.

But it did go straight from treble to bass over that summer holiday?

Went straight down yeh.

> When I first started out, I actually struggled with my range to be honest. It might have been because I did want to stay on as a chorister. When you're a chorister and your voice is breaking you still push it. You know, keep your voice going. I don't know whether that would have contributed.

His perception that his voice went "straight down" from treble to bass over the six weeks of the summer holiday suggests that he had switched instinctively from the M2 he was using as a chorister to the M1 he had, until that September, not been using. Also revealed by this case and the previous one is the probability that for experienced choristers it may be pushing the voice hard in the M2 register that transforms a weak falsetto into a full tone that sounds like "head voice" as suggested by Morris (op. cit.). His "pushing it" whilst it was "breaking" may well be what was necessary to achieve the raised CQ responsible for the "head voice" sound.

Choir 6

Finally, six boys from an all-male "greater" parish church choir that sang a regular weekday evensong were studied in detail. Three were found to possess an M1/M2 split and SF_0 <170 Hz, but they do not represent half the choir. There were other boys not studied in similar detail. The mean tessitura is higher than might be expected because two of the three performed the test only in falsetto.

6 boys aged 10:04 – 14:11

SF_0	>220Hz	200 -219	170 -199	<170
number	2	0	1	3
Mean glide centre	611.8	-	481	311.5
Mean tessitura	C#4-C#5	-	F#3-F#4	B3-B4

The conversation reproduced here is with the head chorister who clearly understood that his voice had split into two registers and realised that agency determined which would be used. The question is that of whose agency. He is unsure as to which register the tester will want him to use but seems equally happy in either. He does not commit to one or the other. No singing teacher was attached to the choir. Had there been one, the situation might have been different.

> ***Age 14:11, SF_0 119Hz.***
>
> *That was in F major. Now why did you choose that octave to sing it in*?
> Because I didn't know, like, I didn't know what you'd prefer me to do, like, whether it would mess with your tests, I suppose.
> *Why should there be any question about it <n>?*
> Well because I'm becoming older, you might have thought that, you might have expected me to do it in a lower, or you might have wanted me to attempt to do it in a higher octave.
> *Mmm. Now the purpose of this test is to see where…*
> Where I'm most comfortable
> *Where you place your voice*
> Right OK.
> *Now do you feel most comfortable up there?*
> Yeah, I feel comfortable enough, yeah.
> *Because you were singing that totally in falsetto. You know what that means, don't you?*
> Yeh.
> *Tell me what that is*
> A male voice that uses high notes, er, that sings high notes.
> *Yes. How does it sing high notes?*
> In a false voice. Is that it?

Yes, sort of. That's what falsetto actually means, false voice. Do you know what makes it false?
The vibrations of the vocal cords, or the vocal folds.
Ee, yes. What's happening is the vocal folds are vibrating just at the edge. Whereas when you're talking to me now you're talking in full voice and the whole vocal folds are in contact. Now, I'll ask you to sing it down here (Plays first line an octave lower)
(Sings successfully in key of F3).
How was that?
Quite easy.
Quite easy. Were there any notes that you struggled with?
Getting up to the pay, [Sings you'll pay me]. It's 'cos of the voice that I'm doing it in.
What's happened is that your real voice has gone down into the tenor octave.
Right
..but because you're not developing your adult singing voice you haven't got the upper part of the adult voice
I know what you mean.
That's something you're going to have to work at with a singing teacher.

Discussion

The variable under consideration in this study is that of vocal agency. Also shown by the varying degree of agency revealed by the boys is variance in the attention given to potential issues of vocal health. The extent to which this differed from choir to choir is significant. In choir 1 it is clear that the director of music is attentive to individual boys' development and is supported by a singing teacher who appears to explain things to the boys. Decisions about dispensation involve input from all three parties, though the boys accept the advice they are given fairly readily. Choir 2 was remarkable for the extent to which the boys appeared to discover their two laryngeal registers only during the actual testing session. Perhaps confronted for the first time with the reality of voice change they seemed unprepared and had not had time to reflect upon what their agency might be. It is perhaps unfortunate that a question about what their school peers thought about their high choir voices was not included since their lack of awareness is remarkable.

Choir 3 was a significant contrast in that the two boys clearly understood that they had voices in the baritone range, though neither explicitly introduced the language of voice change. It was unusual that both (independently of each other) began the £5 test in the modal baritone voice. This also happened in choir 1, but there the boys had already left the choir and their new voices had been recognised by the director of music. In choir 3, the director of music appeared too busy with other matters such as a forthcoming tour to the USA. Dispensation would occur anyway at the end of Y8, a fact that appeared to lead to the boys eking out their remaining time as best they could.

Choir 4 was one of only two to have no boys reach the falsetto stage. It is impossible to state with certainty why this should be. The average heights and weights of the boys in the other choir (not detailed in this paper) were unusually low, a fact that can be attributed only to natural statistical variation. In other years, larger boys might have reached the falsetto stage in that choir. However, in choir 4, allocation to alto on reaching the stage at which falsetto would have been necessary to remain "treble" provides an alternative explanation to natural statistical variation. The evidently different approaches of the two successive directors of music in turn impacted upon the way in which the boys exercised whatever agency they had.

It remains an open question of considerable interest as to why some boys, such as those in choirs 5 and 6, develop a high CQ in their new M2 registers that "sounds like head voice" whilst others, exemplified by choir 2, either mime or produce only a thin, scratchy and expressionless falsetto. Williams et al risk alienating potential colleagues in stating that singing teachers working in cathedrals are poorly trained and variable in the quality of their work. They are, however, supported by Chapman who has consistently held that boy choristers are disadvantaged by the

fact that their directors of music are trained in organ playing and not singing. In discussing the difficulties experienced by a former chorister who wished to become a professional opera singer, she wrote that

> The choral director was basically an organist with choral skills but not personal vocal proficiency or training . . . The recommended voice teachers were often from a similar academic and musical background (Chapman, 1995).

A more recent dissertation on the vocal health of adult cathedral singers would appear to confirm that this situation remains largely unchanged (Chesman, 2022). It may not, therefore, be entirely coincidental that the director of choir 1 was trained as a singer, "the first non-organist to hold the post since the 12th century" according to Wikipedia.

It cannot be a good experience for a boy who was once an able singer to find himself having to mime or experience "hurt at the back of my throat". It is perhaps a reflection on the relative power status of a thirteen-year-old that such disappointments and temporary afflictions are born stoically. It is also notable, however, that when such boys do feel sufficiently empowered to exercise agency, it is likely to be in favour of using their falsetto to remain as a treble because they "want to stay on as a chorister", to "to prolong for as long as I could". The boy analysed by Williams et al (op. cit.) exhibited unusually strong agency as "he had chosen to remain singing as a soprano; he self-reported as being comfortable doing so and he was determined to continue" (Williams et al 2021: 8). This was all the more remarkable as he was reported as being the only one to do so in that particular choir.

The exercise of agency in favour of remaining as a soprano or "treble" would seem to be a phenomenon confined to cathedral style choirs that runs contrary to the agency found in boys elsewhere. Outside cathedral environments it is more common to find boys exercising agency in favour of not singing at all in preference to being accused of "sounding like girls" (Ashley, 2009; Freer 2010). A possible explanation is offered by Lucy Green when she writes of the power of enculturation as "immersion in the music and musical practices of one's environment" (Green 2008). The question of agency is also linked to that of freedom. Allwood's assertion that a boy may continue "for as long as there is no pain or discomfort" allows a young person sovereignty that is denied him by what some might see as the scientistic position taken by Williams.

Conclusion

This paper has taken a relatively unusual stance through highlighting the relationship between the understanding and the will of young singers when much writing elsewhere seems predicated on the presumption that they have either no agency at all or that whatever agency they might have should go unrecognised. It was stated at the outset that the author's aim was to remain relatively impartial with regard to a potentially considerable rift between traditional approaches rooted in eighteenth century bel canto and more recent scientific approaches grounded in work such as that of John Cooksey. In writing the paper, however, I have not remained impartial on the issue of whether the potential agency of thirteen-year-old boys should be afforded any recognition. My belief is that it should and what this paper has shown is the extent to which boys in a specific set of circumstances are left to make sense of a profoundly significant transition in their lives with such little support.

If any young person is to exercise meaningful agency they can only do so when in possession of meaningful information. They need also the support of sympathetic adults who are able to help them interpret the information as befits their particular circumstances. Ultimately, though, the boy's own will may prevail in time. It is ironic that so much consideration is now given to young

people experiencing gender dysphoria when the cisgender community has been left for so long to make sense of similarly profound changes in vocal identity as though they had no agency at all.

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Appendix 1

Ethics Statement

Ethical approval for the work was granted by the full Edge Hill University Ethics Committee. The protocol was derived from the BERA (British Educational Research Association) and the 1983 Helsinki Declaration on Human Experimentation. In order to ensure that full consideration was given to UN Convention on Rights of the Child, Article 12, requiring that children be facilitated to give fully informed consent, versions of the BERA guidelines and an illustrated description of the work to take place were prepared in language accessible to ten- to fifteen-year-old boys. Letters to parents requesting that the research be discussed with the boy at home were circulated via the schools. The letters fully explained the work and its purpose, assuring anonymity and advising of the right to withdraw and the right to review data. Boys were reminded of these rights on the day and given a further verbal explanation with opportunity for questions before work commenced. None opted to withdraw.

Appendix 2

Test Protocol

Acoustic and electroglottogram recordings were made with the Voce Vista system ® using a fixed distance omnidirectional head microphone connected to a Macbook Pro computer. Cross-sectional recordings of necessity took place in a room provided by the school or choir, whilst longitudinal recordings mostly took place in the boys' own homes. Precise ambient conditions were therefore difficult to control but this is not considered a relevant factor in determining the key chosen for the tessitura, highest and lowest terminal pitches or the pitch of the speaking voice as determined by the EGG signal.

The protocol consisted of:

(1) Statement of date of birth and age in years and months.

Mainly for identification purposes and to reference chronological age.

(2) Counting slowly backwards from twenty at normal conversational level.

This test is commonly used to establish the average fundamental frequency of the speaking voice (SF_0). The frequency recorded was the average of the fundamental tones between twelve and five where the voice was most settled. Cooksey identified a close and consistent relationship

between SF_0 and the lowest singing note (Cooksey 2000: 729). In the case of the boys studied longitudinally SF_0 could vary by 15Hz or more between one assessment and another. When the mean of all SF_0s at a given stage was calculated, consistent relationships were found with growth velocity derived from height and weight measurements. Thus, as an indicator of progress from one developmental stage to another in longitudinal study SF_0 had some value, but in cross-sectional study it could not be considered a reliable indicator of developmental stage.

(3) Reading the first paragraph of the phonetic passage *Arthur the Rat*.

This was used as a supplementary measurement of SF_0. SF_0 values obtained by this method were consistently between 10 and 20Hz higher than those obtained by the counting backwards test.

(4) Sing the tune of *Happy Birthday* to the words "You owe me five pounds" in a key intuitively chose by the boy with no starting note given (the "£5 test").

This test was devised as an indicator of a boy's tessitura. Tessitura is recorded in the analysis as the keynote. The tune begins a fourth below its keynote. Boys needed to select a starting note that sounded clearly and was not too low in their range but allowed them to accomplish the octave leap that occurs in the third line of the song without difficulty. Boys whose singing experience was limited would often sing the octave leap appreciably flat or misjudge the note entirely, but almost all choristers managed it successfully. The keys chosen were found to correspond closely to the tessitura ranges given by Cooksey for the stages it was determined the boys had reached. Critically for the present study, boys who had passed beyond the mutational climax to the completing puberty phase found it impossible to perform the £5 test within the treble range unless they did so in falsetto.

(5) Whole range downward vocal glissando starting on highest note that could be sung and whole range upward vocal glissando beginning on the lowest note that could be sung.

This test served two purposes. First it provided objective confirmation about whether the boy had developed a laryngeal registration break and allowed the location of this break to be recorded. Second, it allowed the highest and lowest terminal pitches of the voice to be identified, in most cases showing a somewhat greater range than that of the tessitura test. Cooksey found total singing ranges to be relatively stable and employed them as the sole criterion for his study's index of voice classification. The mean of the highest and lowest pitches reached by an individual was taken as an indicator for this study of where that boy might be in relation to Cooksey's scheme. This presented a difficulty whenever a boy had developed a laryngeal break and began the test in falsetto. Should the falsetto portion of the guide be included? It is worthy of remark that, though Cooksey considered "the vocal register variable" to be a "very important aspect of the voice maturation process" he did not include it in his scheme.